

John Brown Buist

M.D. (Edin.), B.Sc. (Edin.), F.R.C.P.Ed., F.R.S.Ed.
(1846-1915)

An Acknowledgment of his Early Contributions to
the Bacteriology of Variola and Vaccinia

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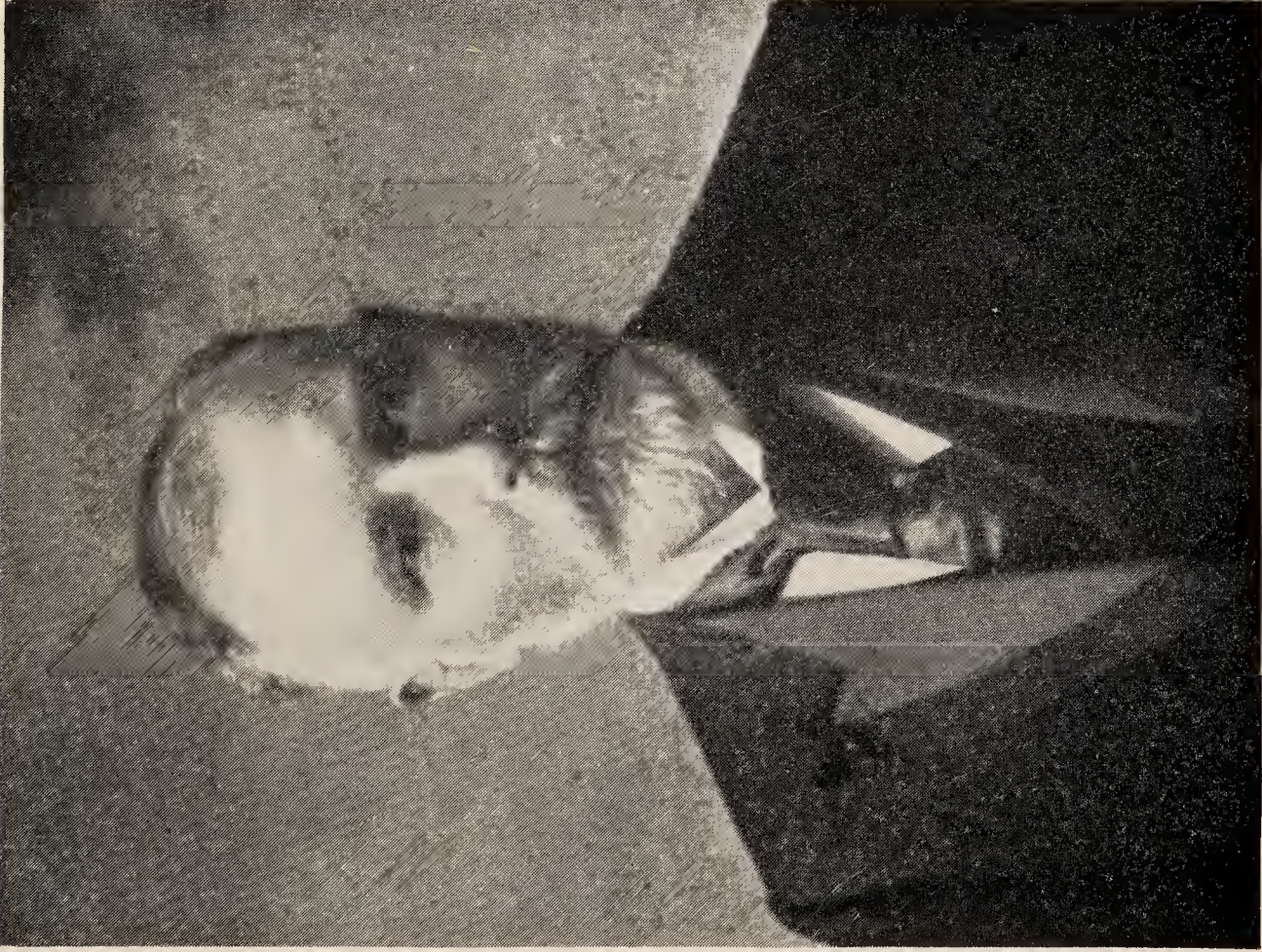
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IN his article on "Virus Bodies," published in this number of the *Edinburgh Medical Journal*, Dr Mervyn Gordon records the sequence of discoveries which have defined the causal agent of variola and vaccinia as a specific micro-organism demonstrable by microscopic methods and identifiable by serological reactions. In the field of research into the ætiology of these infections Gordon occupies a distinguished position, and his recognition of the discovery of the virus bodies of variola and vaccinia by John Buist of Edinburgh may rightly be accepted as authoritative. It is of particular interest that this discovery, apparently overlooked for fifty years, only came to light through Gordon's securing from a London bookseller a copy of Buist's book, *Vaccinia and Variola*, published in 1887. In this work, as pointed out by Gordon, virus bodies of both variola and vaccinia are accurately described and beautifully illustrated by coloured plates. Buist's monograph leaves us also in no doubt that he observed the structures now generally accepted as the "elementary bodies" of these infections and that he identified them as the causative virus. This book was preceded by a paper on the subject in the *Transactions of the Royal Society of Edinburgh* in 1886. Buist's discovery can, therefore, be dated back to this year though it may in fact have been even earlier.

It is only appropriate that some reference should now be made to the life and work of Buist along with the article which puts forward his claim to an important discovery.




JOHN BROWN BUIST

Reproduced from a photograph kindly lent by Mrs Buist.



ENRIQUE PASCHEN

*A photograph taken by C. E. v. R. in Hamburg in 1935.
Reproduced through the courtesy of Frau Paschen.*



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John Brown Buist

From information very cordially given by Mrs J. B. Buist of Edinburgh, and with the kind help of Dr Robert Thin and Mr T. H. Graham of the Royal College of Physicians, we have been enabled to recount something of Buist's career and scientific work.

John Brown Buist was a native of Fife, having been born at Abdie on 4th May 1846, the son of James Buist, farmer, of Braeside, Abdie, near Newburgh. He was a pupil at the Edinburgh Institution from 1858 till he entered the University of Edinburgh in 1862 as a medical student. Among his teachers at the University were Lyon Playfair (Chemistry), James Spence (Surgery) and James Young Simpson (Midwifery). He graduated M.B. in 1867 and immediately after qualification served as House Surgeon in the North Lonsdale Hospital at Barrow-in-Furness where he later commenced practice and held the appointments of Surgeon to the North Lonsdale Hospital and Medical Superintendent of the Smallpox Hospital. Thus his early experiences brought him into close professional contact with smallpox, the ætiology and prevention of which became a dominant interest in his professional life. In 1870 he graduated M.D. at Edinburgh University, his thesis being on "Clinical Observations in Antiseptic Surgery." Buist returned to Edinburgh in 1877 and started private practice there, receiving the appointment of Physician to the Fountain-bridge Dispensary, and in 1879 he was recognised as Lecturer in General Pathology in the School of Medicine of the Royal Colleges. He was admitted a Member of the Royal College of Physicians of Edinburgh in 1878 and elected a Fellow in 1879. In 1886 he became a teacher in vaccination under the Local Government Board for Scotland and worked and taught at the Western Dispensary, the Livingstone Dispensary, Marshall Street and New Town Dispensaries. It is significant of his keen interest in medical science that at the age of fifty-six he took the degree of B.Sc. in Public Health. He was a member of the Edinburgh Obstetrical Society and the Medico-Chirurgical Society of Edinburgh, a Fellow of the Royal Society of Edinburgh, a Fellow of the Society of Antiquaries of Scotland, and a Burgess and Guild Brother of Edinburgh. He is still survived by his second wife, Helen Hutchison. He had no family. At the age of sixty-nine he died suddenly while engaged in professional work. His remains were interred in the Dean Cemetery, Edinburgh.

T. J. Mackie and C. E. van Rooyen

The following is a list of his publications :—

- “ Notes of a case of retroversion of the gravid uterus ” (*Trans. Edin. Obstet. Soc.*, 1880, vol. v., pp. 111-116).
- “ Case of malignant stricture of œsophagus ; circumscribed gangrene of left lung ; double pneumonia ; autopsy ” (*Edin. Med. Journ.*, 1882, vol. xxvii., pp. 878-882).
- “ Note on a case of triplets ” (*Trans. Edin. Obstet. Soc.*, 1885, vol. x., pp. 153-156).
- “ The life-history of the micro-organisms associated with variola and vaccinia. An abstract of results obtained from a study of small-pox and vaccination in the surgical laboratory of the University of Edinburgh ” (*Proc. Royal Soc. Edin.*, 1886, vol. xiii., pp. 603-620).
- Vaccinia and Variola : a study of their life-history* (London, 1887).*
- “ The composition and action of natural and cultivated vaccine and variolous materials ” (*Practitioner*, 1896, vol. lvi., pp. 480-492).
- “ The micro-organisms of vaccine materials ” (*Lancet*, 1900, vol. ii., pp. 1414-1416 ; also letter, p. 1680).
- “ The art of vaccination ” (*Trans. Edin. Obstet. Soc.*, 1901, vol. xxvi., pp. 164-181).
- “ The micro-organisms of vaccine materials ” (*Proc. and Trans. Scottish Micros. Soc.*, 1904, vol. iii., pp. 35-53).
- “ Recent advances in our knowledge of some pathogenic micro-organisms ” (*Proc. and Trans. Scottish Micros. Soc.*, 1904, vol. iii., pp. 57-72).

Some readers of this *Journal* may possibly retain an intimate knowledge of Buist which goes far beyond anything we can say in appraising his personality and work. It is only possible for us to glean from his record and publications the outstanding features of his life and researches. Certain of his publications and his thesis reveal him as an ardent supporter and able exponent of the microbic theory of disease which at an early stage of his career was the subject of acrimonious controversy. He was apparently an enthusiastic vaccinator and advocate of vaccination. His book on vaccinia and variola shows that he was inspired and actuated by the work of Pasteur, Lister and Koch and was fully acquainted with the developments at that time in bacteriological study. As stated in the preface his object was “ to determine the bacteric form in which the contagium of vaccinia and variola exists, in the materials which are capable of reproducing these diseases

* One of us is greatly indebted to Sir Norman Walker for a copy of Buist's book on *Variola and Vaccinia*. It bears the inscription in handwriting : “ To Dr Norman Walker with the compliments of the Author. March 1896.”

John Brown Buist

by inoculation, and in aid of the inquiry advantage has been taken of the most modern methods of bacteriological research.” In this preface Buist returns thanks for the facilities given to him for the inquiry in Professor Chiene’s bacteriological laboratory in the University of Edinburgh, and apparently it was in this laboratory that the discovery of the virus bodies of variola was first made. The laboratory was instituted by Chiene in 1882 after he was appointed to the Chair of Surgery * and was the first teaching bacteriological laboratory in the University, and possibly the first of its kind in Great Britain. This laboratory still exists with some of the original furnishings in the Surgery Department, University New Buildings, but in recent years has been converted to other uses. It bespeaks the very progressive outlook of the professor of surgery and the University authorities in those days, that, when bacteriology was in its early infancy, such resources for investigation should have been available. One cannot but regret the fact that a discovery made possible in this way has been practically overlooked for fifty years. An obituary notice in the *British Medical Journal* in 1915 following Buist’s death contains a significant statement: “There is some reason for thinking that his work on the bacteriology of vaccinia and variola has hardly received the attention it deserves.”

In his researches, Buist employed the only two methods open to him: microscopic examination of stained preparations and cultivation on simple nutrient media. But in staining and microscopic technique he was in advance of his time and was able to distinguish in variolous exudates and vaccine lymph, exceedingly minute organisms whose dimensions (in the light of present knowledge) he most accurately defined (see Figs. 1 and 2 of Gordon’s article). The following quotation may be taken from his book: “The form of bacterium present in clear vaccine lymph is a very minute spore, 0.15μ in diameter.” The size of this virus has recently been estimated by filtration through collodion membranes of graded porosity as 0.125μ to 0.175μ (Elford). Buist was undoubtedly an expert microscopist and the optical system, magnification and staining technique used by him in 1886 are not greatly excelled by those now in vogue for the microscopic demonstration of such virus bodies. Recent work has shown, however, that they

* See *History of the University of Edinburgh*, 1883-1933, and “Looking Back,” by John Chiene, *Edin. Med. Journ.*, 1907.

T. J. Mackie and C. E. van Rooyen

can be artificially increased in size by Paschen's staining method and a preparation obtained by this technique is illustrated in figure A of this article. The stained bodies measure in diameter about one-fourth that of a staphylococcus. This is illustrated in figures A and B which show them along with staphylococci and *B. coli* all stained by the same method. Both preparations have been photographed under identical optical conditions and the illustrations are therefore comparable in scale: each micrometer division is 1.14μ and the total magnification of the photographs is $\times 1187$.

Needless to say, Buist's attempts to cultivate the variola-vaccinia virus were doomed to failure. Even now such viruses cannot be cultivated unless in contact with living tissue cells, and have not yet been grown on any inanimate substrate. By microscopic methods, Buist recognised the virus bodies in the exudate but on cultivating the material obtained growths of micrococci. In the then existing state of knowledge we must admit that he drew a somewhat natural conclusion and regarded the minute bodies as the "spores" of micrococci. He appreciated, however, that his evidence was incomplete and a review of his book in the *Edinburgh Medical Journal* of 1888 contains the following statement: "The author is not too dogmatic, but carefully guards his statements by some qualifying words, which show his modesty and careful regard for the probably antagonistic opinions of others."

In 1906 Professor Enrique Paschen of Hamburg reported the presence of elementary bodies in variolous and vaccinal material. He pursued his discovery and succeeded in establishing their ætiological rôle. His findings have been fully endorsed by subsequent workers and these bodies have been named after him ("Paschen bodies"). His work constituted a most important advance in bacteriological science. One of us (C. E. v. R.) had the privilege of working in Paschen's laboratory in 1935. Paschen apparently had no knowledge of Buist's early observations and publications on variola. Even Paschen's work was at first considered insufficiently conclusive to exclude criticism though all later studies have confirmed his findings. His sentiments on this topic were reflected in a remark addressed to one of us after examining in his laboratory a stained preparation of virus bodies: "Now, do you believe in elementary bodies?" Paschen died on

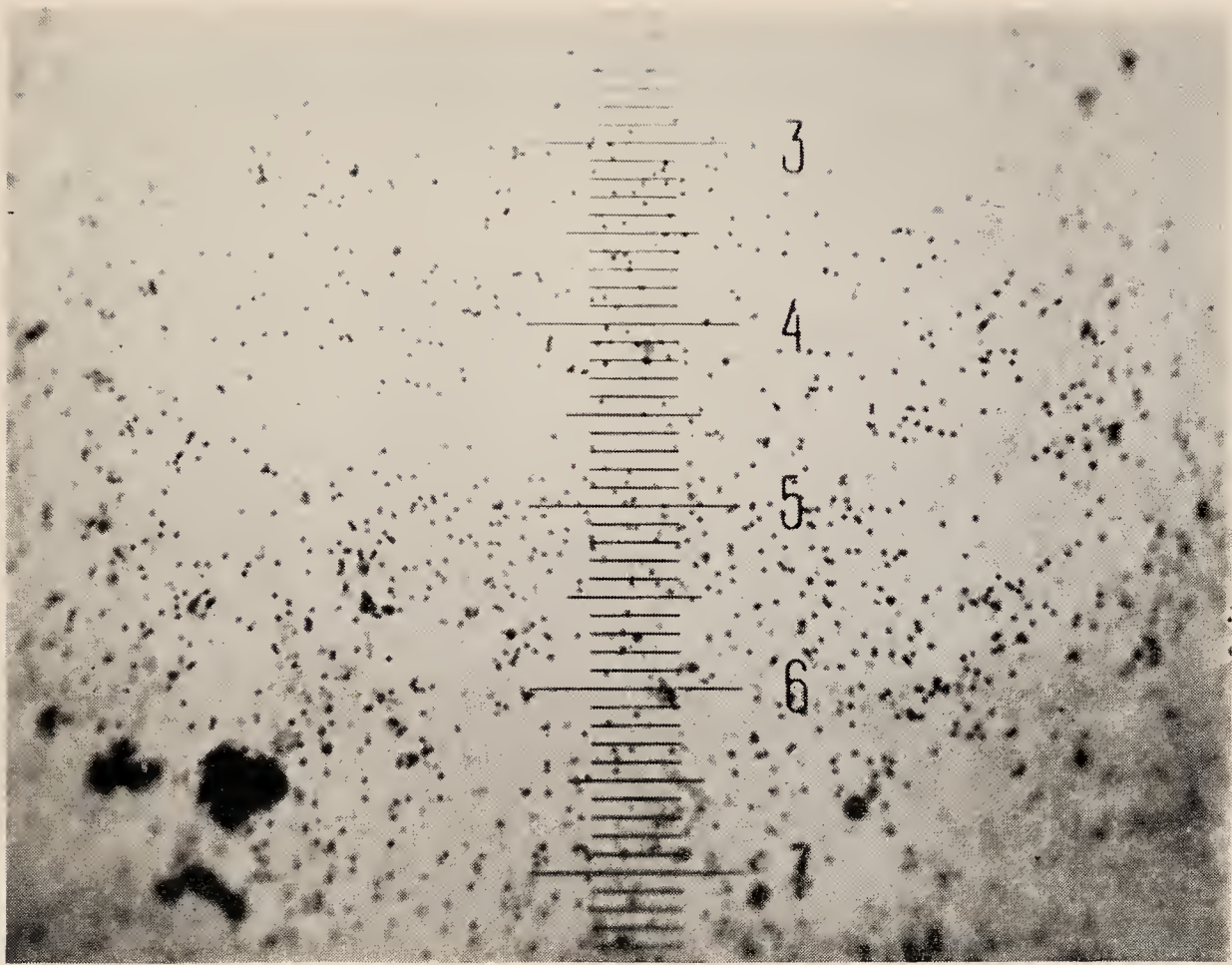


FIG. A.—Preparation of “elementary bodies” (“Paschen bodies”) of vaccinia stained by Paschen’s method. $\times 1187$.

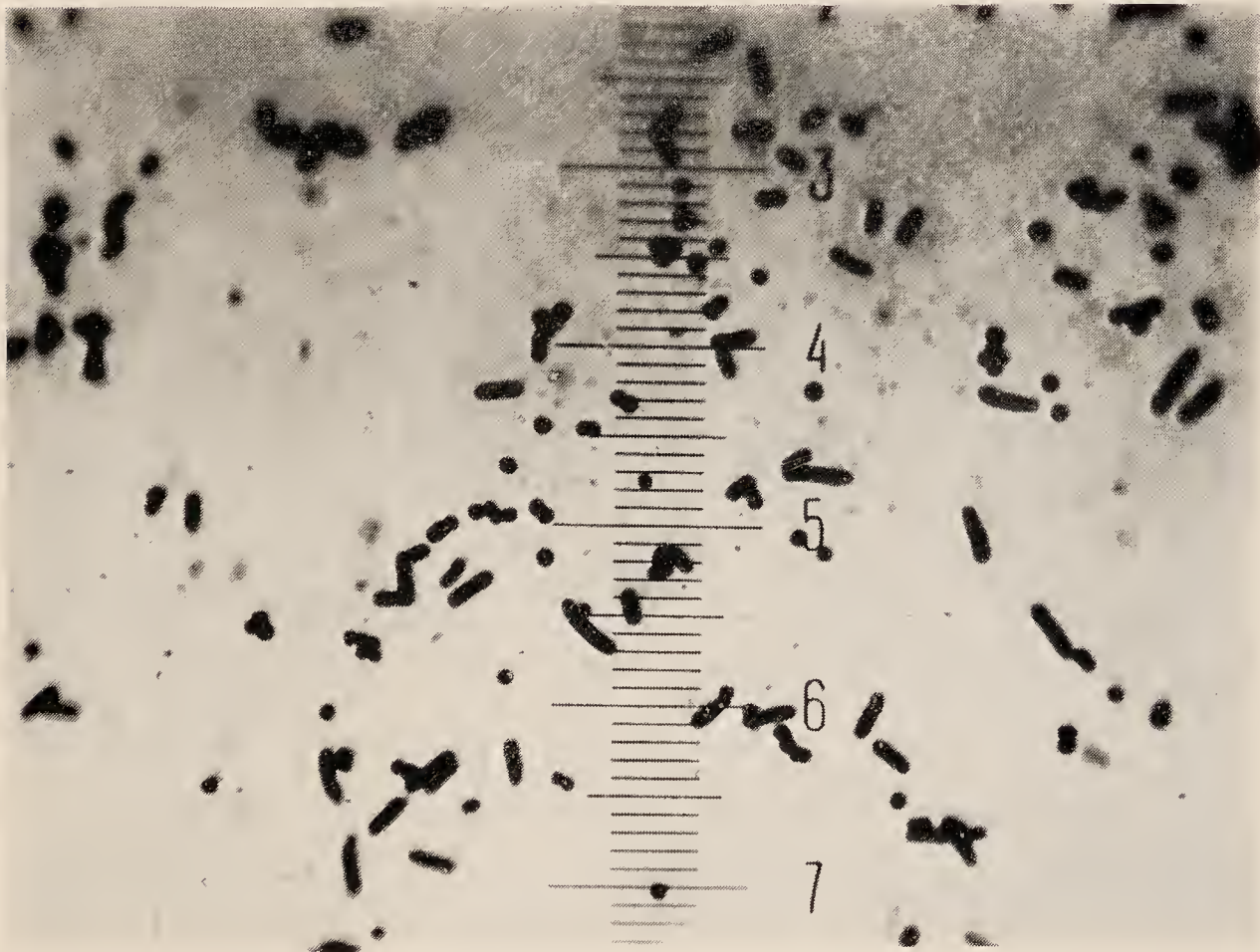


FIG. B.—Film preparation of staphylococcus and *B. coli* stained by Paschen’s method. $\times 1187$.

John Brown Buist

the 22nd October 1936 and for some time previously was known to be suffering from a serious malady. In view of his state of health and out of respect for his great contributions to our knowledge of the variola virus, the priority of Buist's discovery of the virus bodies was not stressed during Paschen's lifetime. It seems to the writers, in agreement with Gordon, that such priority should now be recognised, and we suggest that in the biological designation of this virus the names of Buist and Paschen should be jointly commemorated. Since many of the so-called filterable viruses are now being defined as living entities, the time has come for applying to each of these an accepted biological name, even though their exact position in relation to other organisms remains unsettled. In view of Borrel's recognition of virus bodies in fowl-pox in 1904, the name *Borreliota* has already been proposed as a generic designation for the viruses of the pox diseases of man and animals (see Goodpasture, *Science*, 1933, vol. lxxvii., p. 121). Taking into account the priority of Buist's finding of such bodies in variola and vaccinia in 1886, we venture to suggest "*Buistia*" as the generic name of this group of viruses, and to commemorate Paschen's work we suggest "*pascheni*" as the specific name of the variola-vaccinia virus.

All those who are interested in the history of medicine in Edinburgh owe a great debt to Dr Mervyn Gordon for having brought to light Buist's discovery and for his authoritative recognition of it.

In conclusion, we offer this short article as a tribute to the memory of a bacteriological research worker in the University of Edinburgh of fifty years ago—John Brown Buist.

